- Hastings (5,855,546)
- Crocker (5,782,742).

Concerning Fehsenfeld (5,674,177):

This patent concerns the radioactivity of “stents” (small springs to keep blood vessels open) that are implanted to treat the vessels wall for cancer.

The intensity of the radiation must be strong initially and low for a long time as it is intended for medical purpose.

This is achieved either with a mixture of two species of isotopes, one short lived and one long lived (Col. 1 – line 35-47) and (Col. 2 – line 33), or with a short lived isotope that decays into a long lived one (Col. 2 – line 37).

The isotopes selected by the patentee may be: (Col. 1 – line 35-47):

- Phosphorus (32P15): with a half-life of 14.3 days It decays by beta emission into Sulfur (32S16) which is stable.
- Vanadium (48V23): with a half-life of 16 days. It decays by beta emission into Titanium (48Ti22) which is stable.
- Gold (198Au79): with a half-life of 2.7 days. It decays by beta emission into Mercury (198Hg80) which is stable.

The isotopes chosen are made radioactive by irradiation (Col. 1 – line 37). No mention of Bremsstrahlung is made for irradiation.

The short lived radioactive species listed in the patent (Col. 2 - Line 44-47) are:

- Manganese (52Mn25): with a half-life of 5.7 days.
- Cobalt (55Co27): with a half-life of 0.73 days.
- Technetium (96Tc43): with a half-life of 4.3 days.
- Molybdenum (99Mo42): with a half-life of 2.5 days.
- Nickel (57Ni28): with a half-life of 1.5 days.
- Tantalum (182Ta73): with a half-life of 5 days.
- Rhenium (182Re75): with a half-life of 0.5 days.

The long lived radioactive species listed in the patent (Col. 2 - Line 51-54) are:

- Cobalt (57Co27): with a half-life of 272 days.
- Iron (55Fe26): with a half-life of 2.7 years.
- Zinc (65Zn30): with a half-life of 244 days.

The short lived species decaying into long lived species (Col. 2 – line 57) are:

- Cobalt (55Co27): decaying with a half-life 0.73 days to Iron (55Fe26) having itself a half-life of 2.7 years.
- Rhenium (182Re75): decaying with a half-life 0.5 days to Tungsten (181W74) having itself a half-life of 121 days.
- Nickel (57Ni28): decaying with a half-life 1.5 days to Cobalt (57Co27) having itself a half-life of 272 days.

Only four of above isotopes have a metastable state:

- Gold (198Au79) which has a metastable state (198Au79m) with a half life of 2.3 days.
- Manganese (52Mn25) which has a metastable state (52Mn25m) with a half life of 21.1 minutes.
- Technetium (96Tc43) which has a metastable state (96Tc43m) with a half life of 52 minutes.
- Tantalum (182Ta73) which has a metastable state (182Ta73m) with a half life of 15.9 minutes.
- Rhenium (182Re75) which has a metastable state (182Re75m) with a half life of 12.7 hours.

The methods of manufacturing of these four metastable isotopes are not described in the patent :
Hence entangled Gold (198Au79m), entangled Manganese (52Mn25m), entangled Tantalum (182Ta73m), and entangled Rhenium (182Re75m) are <u>not inherently described in Fehsenfeld (5,674,177)</u>.

<u>Concerning Crocker (5,782,742) :</u>
This patent describes a catheter balloon with radioactive walls that can be inflated in a body vessel for radioactive irradiation.

The wall of the balloon are lined up with various isotopes.

Radioactive isotopes are :

- Phosphorus (32P15): with a half-life of 14.3 days It decays by beta emission into Sulfur (32S16) which is stable.
- Yttrium (90Y39): with a half-life of 2.6 days. It decays by beta emission into Zirconium (90Zr40) which is stable.
- Gold (198Au79): with a half-life of 2.7 days. It decays by beta emission into Mercury (198Hg80) which is stable.
- Iridium (192Ir39): with a half-life of 73.8 days. It decays by beta emission into Platinum (192Pt78) which is stable.

Other isotopes cited in the patent are:

- Phosphorus (31P15) which is stable (Col 7 – line 29 and Col. 8 – line 10).
- Gold (197Au79) which is stable (Col 9 – line 41).
- Aluminum (28Al13): with a half life of 2.24 minutes (Col 9 – line 45). It decays by beta into Silicone (28Si14) which is stable.
- Aluminum (27Al13) which is stable (Col 9 – line 45).
- Aluminum (24Al13): with a half-life of 2.07 seconds (Col 9 – line 45). It decays by beta+ into Aluminum (27Al13) which is stable.
- Molybdenum (99Mo42): with a half life of 65.94 hours (Col 8 – line 35-50). It decays by beta into Technetium (99Tc43) which is not stable. Technetium (99Tc43) decays with a half life of 2.1 10^5 years by emitting beta into Rubidium (99Ru44) which is stable.
- Molybdenum (98Mo42) which is stable (Col 8 – line 35-50).

Only the following metastable isotopes have a metastable state:

- Aluminum (24Al13) which has a metastable state (24Al13m) with a half life of 0.13 milliseconds.
- Yttrium (90Y39) which has a metastable state (90Y39m) with a half life of 3.19 hours.

- Irridium (192Ir77) which has two metastable states: (192Ir77m1) with a half life of 1.44 minutes and (192Ir77m) with a half life of 241 years.
- Gold (198Au79) which has a metastable state (198Au79m) with a half life of 2.3 days.
- Gold (197Au79) which has a metastable state (197Au79m) with a half life of 7.8 seconds.
- Technetium (99Tc43) which has a metastable state (99Te43m) with a half life of 6 hours.
- Zirconium (90Zr40) which has a metastable state (90Zr40m) with a half life of 0.8 second.

However :

- Gold (198Au79) is obtained by irradiation of Gold (197Au79) with a neutron beam (Col 9 – line 41), thus possibly producing metastable Gold (198Au79m) and (197Au79m), but the patent does not mention if the neutrons are entangled. Hence entangled metastable Gold (198Au79m) and entangled metastable Gold (197Au79m) are not described inherently in the patent.
- Aluminum (24Al13) is obtained by irradiation of Aluminum (27Al13) with a fast neutron beam (Col 9 – line 45), thus producing metastable Aluminium (24Al13m), but the patent does not mention if the neutrons are entangled. Hence entangled Aluminium (24Al13m) is not described inherently in the patent.
- Molybdenum (99Mo42) is obtained by irradiation of Molybdenum (98Mo42) with a 5.92MeV neutron beam (Col 8 – line 35-50). Hence some Technetium (99Tc43) may present, thus leading to some metastable Technetium (99Tc43m), but the patent does not mention if the neutrons are entangled. Hence entangled Technetium (99Tc43m) is not described inherently in the patent.
- Neither Yttrium (90Y39), nor Zirconium (90Zr40) manufacturing methods are not mentioned. Hence neither entangled metastable Yttrium (90Y39m), nor entangled metastable Zirconium (90Zr40m) are described inherently in the patent.

Concerning Hasting (5,855,546):

It is the description of a super catheter for radioactive irradiation, angioplasty and drug infusion.

The text of the patent is mostly dedicated to the mechanical description of the catheter. The word “radiation” is used 232 times in the text but the type of preferred sources is described only starting in column 15.

The preferred sources for irradiation of patients are as follows:

- Nickel (66Ni28): with a half life of 54.7 hours. It decays by emitting , beta -in copper (66Cu29) in 5.1 minutes which is not stable.
- Copper 66Cu29: with Half Life 5.1 minutes. It decays by emitting Beta – to Zinc (66Zn30).
- Gadolinium (153Gd64): with a half life of 241.6 days. It decays by emitting 69 keV and 103 keV gamma to Europium (153Eu63) which is stable.
- Yttrium (90Y39): with a half-life of 2.6 days It decays by beta emission into Zirconium (90Zr40) which is stable.

The following isotopes have a metastable state:

- Yttrium (90Y39) which has a metastable state (90Y39m) with a half life of 3.19 hours.

This document does not mention how the isotopes contained in the preferred sources are obtained. Hence, entangled metastable Yttrium (90Y39m) is not described inherently in the patent.

Concerning Hektner (6,019,718):

It is the description of a super catheter for radioactive irradiation, and angioplasty. The radioactive string can be retrieved and placed in a vault.

The text of the patent is mostly dedicated to the mechanical description of the catheter. The word “radiation” is used 118 times in the text but the type of preferred sources is described only starting in column 9.

The preferred sources are as follows:

- Nickel (66Ni28): with a half life of 54.7 hours. It decays by emitting , beta -in copper (66Cu29) in 5.1 minutes which is not stable.
- Copper 66Cu29: with Half Life 5.1 minutes. It decays by emitting Beta – to Zinc (66Zn30).
- Iridium (192Ir39): with a half-life of 73.8 days. It decays by beta emission into Platinum (192Pt78) which is stable.
- Yttrium (90Y39): with a half-life of 2.6 days. It decays by beta emission into Zirconium (90Zr40) which is stable.
- Strontium (90Sr38): with a half life of 29 years. . It decays by beta emission into Yttrium (90Y39) with is not stable (see above).

Only the following metastable isotopes have a metastable state:

- Irridium (192Ir77) which has two metastable states: (192Ir77m1) with a half life of 1.44 minutes and (192Ir77m) with a half life of 241 years.
- Yttrium (90Y39) which has a metastable state (90Y39m) with a half life of 3.19 hours.
- Zirconium (90Zr40) which has a metastable state (90Zr40m) with a half life of 0.8 second. Hence neither entangled metastable Irridium (192Ir77m), nor entangled metastable Yttrium (90Y39m), nor entangled metastable Zirconium (90Zr40m) are described inherently in the patent.

<u>Conclusion:</u>

Neither Fehsenfeld (5,674,177), nor Crocker (5,782,742), nor Hastings (5,855,546), nor Hektner (6,019,718) describe inherently any entangled metastable isomer.

Amendment to the claim listing:
The generic claim 1 and 3 have been withdrawn this autumn: this may be a misunderstanding on our part and we would like to proceed to their examination as you stated on page 2 of your detailed action. If authorized, please change their status so that their examination could proceed. However we would like to cancel claim 7.
We propose to amend claim 1 in order not to claim Nobium (99Nb41m).

Claim 2 is currently amended to be made dependant upon claim 1 which would not modify its current scope.
Claim 6 and 7 are cancelled.
Claim 10 is currently amended to allow carrying out the manufacturing method on all applicable sorts of isomer nuclides, except Niobium (99Nb41).
Claim 12 is currently amended to refer to claim 1.
Claim 41 is a new claim dependant upon claim 41 wherein the sort of isomer nuclides is chosen in a list.
Claim 42 is a new claim dependant upon claim 41 wherein the properties of claim 11 have bee copied.

Concerning the election/restrictions requirement:
We would like to **elect <u>with traverse</u> Group V**, claim(s) 25-39, drawn to different materials of the samples, which comprises unchanged claims although they refer to currently modified claim 2 (the scope of which is unchanged because of the limitation to species).
We also would like to elect with traverse species Indium.
The following claims could be read on the Indium species:

- Claim 1
- Claim 2
- Claim 4
- Claim 5
- Claim 8
- Claim 10
- Claim 11
- Claim 12
- Claim 13
- Claim 14
- Claim 15
- Claim 18
- Claim 19
- Claim 20
- Claim 21

- Claim 22
- Claim 23
- Claim 29
- Claim 40
- Claim 41
- Claim 42

The main reasons that the elections with traverse are justified are:
The products of claim 1 wherein Niobium (99Nb41) is disclaimed now links all the group of claims. It has been showed that the four patents opposed to claim 2 did not cause a lack of novelty nor of inventive step to the product list of claim 2, neither to the generic claim 1 where Niobium (99Nb41) is disclaimed.
The independent claims 1, 10, 12 are generic and aimed at the same products with the same disclaimer. Moreover, there is no basis which could lead to believe that the claims would not to perform on the species.
In our opinion, the reasons stated our answer dated August 8th 2009 to your action mailed July 14th 2009 are still applicable (page 2 and 3) changing mutates mutandis the groups and claims numbering.
Hence we respectfully ask for a fair application of the Patent Cooperation Treaty considering the following:

- The fact that an independent claim (where there is no embedded alternatives) defines an invention in the Patent Cooperation Treaty's terminology,
- The Patent Cooperation Treaty Articles and more precisely Rules 13.1 and Rules 13.2
- Our arguments refuting your preliminary analysis concerning the absence of a technical relationship among those inventions involving one or more of the same or corresponding special technical features.

We are aware that applying an international treaty such as the PCT may be difficult because it is not as detailed as is the US laws and regulations, or the MPEP guidelines which are applicable to US application only as regarding to the unity of invention.

Please find the following sections in this amendment:

CLAIMS: a revision mode claim listing begins on page 11 and a clean version begins on page 17.

REMARKS: remarks are in the above text.

I am late answering your action since I had to undergo a surgical intervention which kept me two weeks in hospital during new year holyday and one month in convalescence. Moreover, I would like to stress that the four patents opposed to claim 2 where not accompanied by specific instructions pointing to the inherently entangled metastable isomers, consequently they required a lengthy and detailed examination that took me a long time. Please should there be more such documents, could you allow a “shortened statutory period for reply” slightly longer than 1 month as the mail takes two weeks from New Zealand where the action was mailed to reach France.

We are prepared to consider any further concerns you may have on patentability of our claims in order to proceed to the right protection of the invention.

Respectfully yours.

S-SIGNED: /Robert DESBRANDES/
Robert DESBRANDES
Inventor.